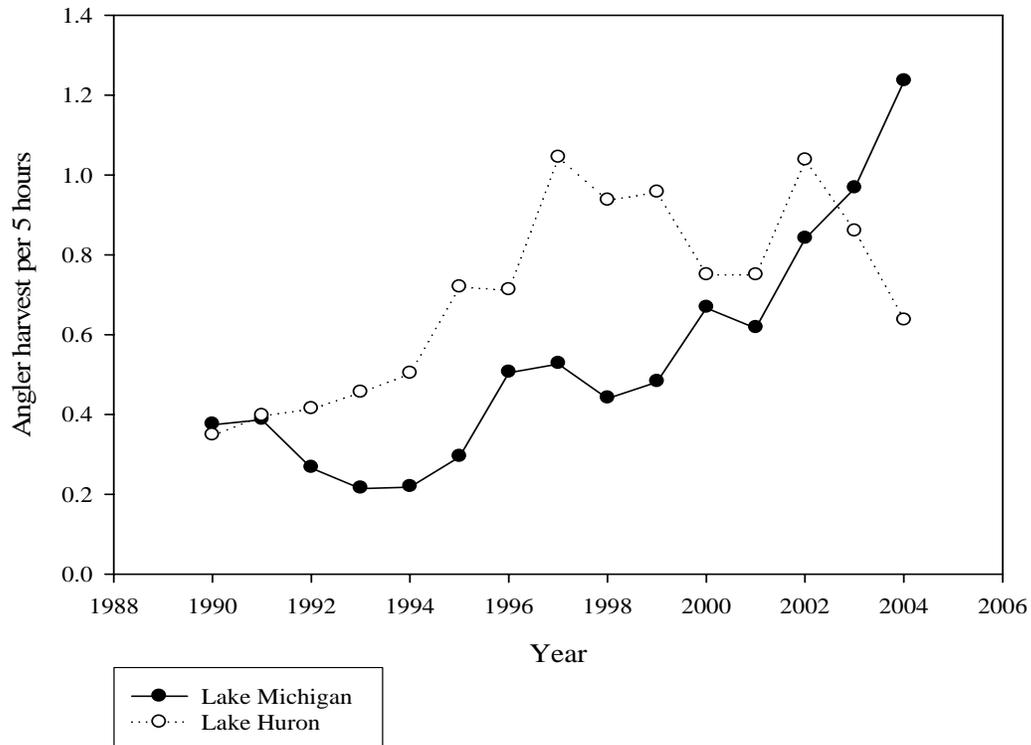


Charter Boat Fishing Effort and Harvest from the Michigan Waters of the Great Lakes, 2004

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Lake Michigan and Lake Huron Chinook Salmon Harvest Rate



**Michigan Department of Natural Resources
Fisheries Division
Charlevoix Fisheries Research Station
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Introduction

Michigan's charter boat industry increased from 250 operations in 1979 to nearly 900 in 1989. In the late 1980s, the number of charter boats used for sport fishing excursions on Michigan's Great Lakes waters began to decline and has fluctuated around 550 boats (542 in 2003 and 559 in 2004). The charter fishing industry provides Michigan with significant economic benefits. For example, 239,000 clients spent an estimated \$21 million in addition to charter fees in 1985, and the total statewide investment by charter boat firms in the same year was estimated to exceed \$30 million.

Public Act 451 (Part 445) of 1994 requires charter operators to report their monthly effort and harvest. Similar legislation was first enacted in 1989 (Act 22, Public Acts of 1989). Legislation is supported by the Michigan Charter Boat Association (MCBA) and Michigan Department of Natural Resources (MDNR). Among other provisions, the law requires charter boat operators to report their fishing effort and harvest on a monthly basis and to keep an up-to-date daily log of their fishing activity onboard their vessel at all times. Prompt reporting makes it possible for MDNR personnel to report charter fishing statistics in a timely manner.

The charter catch reporting system provides a complete and continuous annual record of (1) charter fishing effort (e.g. hours fished) and (2) number, type and location of fish harvested by charter anglers. MDNR fisheries biologists integrate these data with other sources to manage Great Lakes fisheries. They value these datasets because they provide comprehensive measures of fishing on a state-wide level. The data are equally valuable to charter operators who can measure the health and welfare of their industry.

Methods

In 1989, a committee of two members each from MDNR and MCBA developed The Michigan Charter Boat Daily Catch Report form. This form is mailed to all known charter

operators in the spring of every year. Great Lakes grid maps (used to identify fishing location) are included with this mailing. Charter operators are identified from (1) a list of operators who had submitted catch reports the previous year and (2) individuals who applied for and/or received new Sport Trolling Licenses.

Charter operators are required by law to complete the form every time they fish and mail it to the Charlevoix Fisheries Research Station by the tenth of each month following the month of fishing. At the top of every form, charter operators must list his/her charter boat identification number and the lake that was fished. If a charter operator owns more than one boat, or fishes in multiple Great Lakes, he/she must fill out a form for each boat and each lake. For a given boat and lake, data from every excursion must be recorded *regardless of fishing success*. Each excursion must include: date, port of origin, grid where a majority of the fishing occurred on that excursion, hours fished (dock to dock), number of resident and nonresident anglers, harvest (number) of major species, and number of sea lamprey seen *attached* to Chinook salmon and/or lake trout. Space is provided at the bottom of the form for comments and observations.

Charlevoix Fisheries Research Station personnel keep records of forms as they are received. Data are entered into a database and summarized to describe port-specific and lake-wide trends in the effort and harvest of the major sport-fish. If a form is incomplete, Charlevoix personnel return the form to the charter operator with an explanation and a request for a correction.

The majority of charters operate during April through October. Each month, June through October, MDNR issues postcard notices to charter operators who do not file a catch report from the previous month. Two notices are sent each month, the first after an operator is delinquent for 10 days and the second after 30 days. Operators who have delinquent reports for two or more months during the period May through September are sent letters via certified mail in December. These letters inform the operator that he/she is receiving the final request

to submit their reports. If the recipient does not respond in writing within 10 days of receipt of this notice, his/her name may be submitted to MDNR's Law Enforcement Division recommending non-issuance of an inspection certificate for the following season. If MDNR personnel do not receive a form, they assume an operator is delinquent because they cannot distinguish delinquent operators from those who do not fish. If the charter operator does not wish to submit a form to MDNR because he/she did not fish during a given season, he/she must inform MDNR personnel.

Charter data are used to summarize three types of fishing effort: angler hours, angler trips, and charter excursions. Angler hours are the total number of hours in a charter excursion, dock to dock. An angler trip is one completed fishing outing by one individual (also equivalent to the number of charter anglers). A charter excursion is one completed boat trip. For example, if a charter operator took four anglers fishing for six hours, total fishing effort is 24 angler hours, 4 angler trips, and one charter excursion. Measures of effort are often summed across numerous operators to obtain total values for a given port or Great Lake.

Charter data are also used to summarize the harvest and harvest rate of those sport-fish listed on the form. "Harvest" is equivalent to the number of fish kept by a charter angler. Harvest rate is the number of fish harvested in a given amount of time (e.g. number/hour). For example, a charter angler may catch 3 fish on a 5 hour trip, but chooses to release one fish. His/her harvest is 2 and his/her harvest rate is 0.4 fish per hour.

Charter operators also record the number of sea lamprey observed on lake trout and Chinook salmon. These data are collected by request of the U.S. Fish and Wildlife Service's (USFWS) Sea Lamprey Control Station in Marquette, Michigan, where lamprey incidence (i.e. number of lamprey attached per 100 fish) is used as one of several indices of sea lamprey abundance.

Results

Compliance

During the 2004 fishing season, 64% of all charter boat operators complied with the law by submitting their catch reports on time while 81% submitted reports within 30 days of the due date. By January, 2005, 96% of all charter operators had submitted their 2004 reports. This is 2% less than the 2003 compliance rate (98%).

Fishing effort and harvest

Reports of fishing effort and harvest at individual fishing ports can be found at the MDNR website:

<http://www.michigan.gov/dnr/>

In this report, we summarize the "lake-wide" temporal (1990-2004) and spatial (across Great Lakes) trends of Michigan charter boat anglers. Fishing effort and harvest will now be reported January-December. In past reports, only April-October was reported. All graphs and comparisons in this report include all 12 months regardless of year. They include effort and harvest from all charter excursions, including those that occur on Great Lakes tributaries.

Fishing effort

In 2004, a total of 66,845 charter anglers participated in 16,100 excursions on the Michigan waters of Lakes Michigan, Huron, Erie, Superior, and the St. Clair system, including the major tributaries, and spent 391,035 angler hours fishing (Tables 1 through 5). In 2003, 76,151 anglers participated in 17,846 excursions and fished 450,171 hours. There was a 12% drop in charter anglers, 10% drop in excursion number and 13% drop in angler hours.

When data were first collected in 1990, the total charter effort across all the Great Lakes was higher than it is today (Figure 1). In 1991, charter effort dropped significantly and remained relatively low until 1995 when it began to increase again (Figure 1). After 1999, the number of angler trips declined again (Figure

1); in 2004, it was as low as it was in the early 1990s. Trends in angler trips are very similar to trends in angler hours and excursions; therefore, we only present temporal analyses of trips. Angler hours and excursion totals on each Great Lake are available on Tables 1 through 5. Angler hours and excursion totals for individual ports can be found on the website.

On a finer spatial level, the greatest change in charter angler trips between 2003 and 2004 occurred on Lake Erie (8,514 to 3,603; -58%; Figure 2a) and the St. Clair System (1,901 to 1,292; -32%; Figure 2b), followed by Lake Superior (2,446 to 2,044; -16%; Figure 2b). In contrast, there was a much smaller change in trip number between 2003 and 2004 on Lake Huron (10,318 to 9,947; -4%) and Lake Michigan (52,972 to 49,959; -6%) (Figure 2a).

The change in effort on Lake Erie between 2003 and 2004 is quite large relative to the annual changes that have occurred in the past (Figure 2a). There was less effort on Lake Erie in every month of 2004. We hypothesize this change to have occurred from a combination of (1) walleye season closures in the spring, (2) more accurate reporting of those fish harvested from Michigan waters (i.e. some charter anglers may have erroneously reported fish harvested in Ohio waters in the past), and (3) possible redirected effort into Ohio waters or other Great Lakes waters. It is not clear at this time how much each of these mechanisms may have influenced the reduction in effort on Lake Erie. As with any area, reporting errors may have also contributed to this change. Reduced effort across all of the lakes may have been due to poor weather conditions in the spring that made it difficult to fish.

In 2004, 28% of all charter anglers were non-residents of Michigan. This value has remained quite stable over the last few years. Numerically, the largest number of non-residents frequented Lake Michigan in 2004; however, Lake Superior charter operators continued to host the greatest "proportion" (56%) of non-resident to resident anglers in 2004 (Table 4).

Harvest

Charter operators reported a total of 157,239 fish harvested from the Michigan waters of the Great Lakes and its major tributaries (Tables 1 through 5). Most of these fish were harvested from Lake Michigan (63%), followed by Lake Huron (16%) and Lake Erie (14%). Similar to 2003, the most numerous species in the 2004 total harvest was Chinook salmon (74,962). In contrast to 2003, the second most abundant species in 2004 was lake trout (24,245) followed by yellow perch (19,470), and walleye (17,329). Yellow perch has historically been the most abundant species in the catch rather than a salmonine. There has been a noticeable shift in the overall charter harvest composition since 1990 (Figure 3).

Relative to 2003, 2004 Chinook salmon harvest numbers increased by 14%. For all other species, 2004 harvest numbers decreased: 24,245 lake trout (4% less than last year), 9,587 coho salmon (12% less than 2003), 7,478 rainbow trout (33% less than 2003), and 909 brown trout (44% less than 2003). The "other" species category accounted for the remainder of the harvest; however, the species composition of this category is not fully known because MDNR does not require it to be identified. Charter operators who wish to identify this category can do so in the "Comments" section on the Charter Harvest Form.

Despite the drop in numbers of several fish species, the overall numbers of salmonines (Chinook salmon, coho salmon, lake trout, rainbow trout, and brown trout) harvested from Michigan's Great Lakes waters actually increased between 2003 and 2004 by 2,644 fish (+2%). The decrease in percids (yellow perch and walleye) had the greatest impact on lower numerical harvest in 2004: 95,171 (2003) compared to 36,799 (2004).

Harvest composition and changes in the total harvest, by species, vary by Great Lake. For example, Lake Michigan had a higher harvest of Chinook salmon and lower harvest of lake trout in 2004 compared to 2003, while Lake Huron had the opposite results: a lower harvest of Chinook and higher harvest of lake trout. Changes in harvest numbers vary from year to

year and are often correlated with changes in effort; therefore, the best way to evaluate the fishery is to compare harvest rates, as discussed in the following section.

Harvest rates

All harvest rates presented in this report are equivalent to the number of fish a charter angler harvests every 5 hours (rather than 1 hour or 100 hours as presented in previous reports). A 5 hour rate can be more informative to a charter angler who averages 4-6 hours per charter excursion. Regardless of the number of hours used, rates can be compared across lakes and years as long as the same rate is used among the comparisons.

Also new to this report is an improvement in the method used to calculate harvest rates. Prior to 2004, lake-specific harvest rates of any one species in the charter harvest were based on total fishing effort in that lake, regardless of species targeted. The new method separates percid (walleye and yellow perch) effort from salmonine (trout and salmon) effort and uses one of these two efforts to calculate the harvest rates of individual species within each group. We applied this new method to all charter data, 1990 to 2004, and present the temporal trends for each species. The new methodology has the greatest effect on percid harvest rates where the smaller proportion of the total effort occurs.

2004 harvest rates

Across all of the Great Lakes in 2004, charter anglers harvested 2.00 yellow perch, 1.87 walleye, 1.11 Chinook salmon, 0.33 lake trout, 0.14 coho salmon, 0.10 rainbow trout and 0.01 brown trout per 5 hours of angling. Although Chinook salmon are the most abundant species in the harvest, percids were harvested at the highest rate.

On Lake Michigan, percid charter anglers harvested 2.16 yellow perch (48% less than 2003) and 0.80 walleye (32% more than 2003) every 5 hours (Table 1). Lake Michigan salmonine anglers harvested 1.23 Chinook salmon (27% more than 2003), 0.17 coho salmon (6% less than 2003), 0.12 rainbow trout (35% less than last year), 0.10 lake trout (25%

less than last year) and 0.01 brown trout (50% lower than last year) every 5 hours (Table 1). Harvest rates increased for Chinook salmon and walleye, but decreased for all other species.

When we used targeted effort rather than total effort, we found the 2004 harvest rate of yellow perch on Lake Michigan (2.16 per 5 hours; Table 1) to be comparable to Lake Erie (2.13 per 5 hours; Table 3). In past reports, the Lake Michigan yellow perch harvest rate (0.26 per 5 hours in 2003) was much less than Lake Erie (3.12 per 5 hours in 2003). With the effort correction, the 2003 yellow perch harvest rate on Lake Michigan was 4.14 per 5 hours, approximately 16 times larger than the original value.

On Lake Huron, percid charter anglers harvested 0.11 yellow perch (74% less than 2003) and 1.18 walleye (1% less than 2003) every 5 hours (Table 2). Most of the percid harvest occurred in the Saginaw Bay area. Lake Huron salmonine charter anglers harvested 1.49 lake trout (24% more than 2003), 0.64 Chinook salmon (26% less than 2003), 0.05 rainbow trout (25% less than last year), 0.02 coho salmon (34% higher than 2003) and 0.02 brown trout (33% less than 2003) every 5 hours (Table 2). Harvest rates increased for lake trout and rainbow trout, remained virtually unchanged for walleye, but decreased for all other species.

In 2004, Chinook salmon harvest rate was twice as high on Lake Michigan (1.23 per 5 hours) as it was on Lake Huron (0.64 per 5 hours; Tables 1 and 2). In contrast, lake trout harvest rate on Lake Huron (1.49 per 5 hours; Table 2) was 15 times greater than Lake Michigan (0.10 per 5 hours), and equal to the lake trout harvest rate on Lake Superior (1.49 per 5 hours; Tables 1, 2 and 4).

Walleye and yellow perch are the dominant species in the charter harvest on Lake Erie. In 2004, percid charter anglers on the Michigan waters of Lake Erie harvested 2.19 yellow perch and 3.00 walleye per 5 hour trip (both 30% less than 2003; Table 3). The walleye harvest rate on Lake Erie (3.0 per 5 hour trip; Table 3) was highest of all Great Lakes.

On Lake Superior, lake trout are the most important salmonine in the charter harvest

(Table 4). Compared to 2003, 2004 harvest rates of lake trout on Lake Superior increased from 1.36 to 1.49 (+10%) per 5 hour trip.

In 2004, percid charter anglers on the Michigan waters of the St Clair system harvested 2.13 yellow perch (13% less than 2003) and 1.29 walleye (4% more than 2003) per 5 hour trip (Table 5).

Long-term changes in harvest rates, 1990 to 2004

Harvest rate can vary by species, lake and time. It is difficult to determine the precise cause of variations because more than one mechanism is usually at work. For example, changes in harvest rates can be influenced by a combination of (1) changes in angler behavior (e.g. greater effort towards the more abundant species), (2) weather-related impacts on fishing success, and (3) changes in the abundance and movement of a fish population, to name a few. We will review the changes in species-specific harvest rates over time and compare them among lakes, but we cannot always identify the causes of these changes without additional research.

Historically, Chinook salmon harvest rates were higher on Lake Huron than they were on Lake Michigan and harvest rates on both lakes generally increased over the time series (Figure 4). In recent years, the pattern of Chinook salmon harvest rate on Lake Michigan and Lake Huron has diverged and Lake Michigan harvest rate is now higher than Lake Huron (Figure 4). In contrast, lake trout harvest rates on Lake Huron have increased since 1992 and are well above those on Lake Michigan, where rates have decreased since 1998 (Figure 5). In fact, 2004 lake trout harvest rates on Lake Huron were the same as those on Lake Superior, where lake trout harvest rates are typically much higher than the other Great Lakes.

Charter anglers may shift their effort towards another species when they have difficulty catching their preferred target or when they are disappointed in the harvest (e.g. fish are in poor condition), such as what may have occurred on Lake Huron in 2003 and 2004 when Chinook salmon harvest rates decreased as lake

trout harvest rates increased (Figure 4 and 5). Sometimes the lower harvest rates also follow the same trends as the fish population itself. Other research suggests a decrease in the population of Chinook salmon in Lake Huron (J. Johnson, MDNR, Alpena Fish Research Station, personal communication), yet it is less clear if increased harvest rates of lake trout are related to anything besides redirected effort.

On Lake Michigan, the opposite has occurred: Chinook salmon harvest rates have increased as lake trout harvest rates have decreased (Figures 4 and 5). One or more mechanisms may be related to the increase in Chinook salmon harvest rates. There may be more Chinook salmon in Lake Michigan, charter operators may be targeting Chinook salmon more than other salmonines, and/or Chinook salmon may be selecting fishing lures at an increased rate because the forage base is low (R. Claramunt, MDNR Charlevoix Fish Research Station, personal communication). Various mechanisms are likely influencing observed changes in lake trout harvest rates, too.

Unlike Lakes Michigan and Huron, lake trout harvest rates on Lake Superior (Figure 5) have remained quite stable over the last 15 years. Consistency in targeted effort (i.e. Lake Superior charter anglers are less likely to redirect their effort towards other salmonines because lake trout are the predominant species) and a population that has likely stabilized since its rehabilitation in the 1980s are the probable explanations for stability in harvest rates.

Coho salmon and rainbow trout harvest rates are typically highest on Lake Michigan (Figure 6 and 7). Coho salmon harvest rates have sometimes changed significantly in a single year on several of the Great Lakes, but do not appear to be increasing or decreasing over time (Figure 6).

Rainbow trout (steelhead) harvest rates on Lake Huron peaked in 1994-1995 (Figure 7). Currently, they are lower than what was observed in the mid to late 1990s, yet comparable to harvest rates in the early 1990s (Figure 7). On Lake Michigan, steelhead harvest rates appear to have decreased over time (Figure 7).

Similar to rainbow trout, brown trout harvest rates on Lake Huron peaked around 1993-1995 (Figure 8). Since that time, they have remained quite low. Lake Michigan brown trout harvest rates show less contrast, but still take on a bit of a “bell-shaped” appearance over the last 15 years, with rates highest in the mid to late 1990s and lower before and after that time period. For steelhead and brown trout, it may be difficult to determine how much of the trends in charter harvest rate are due to fish population changes relative to other mechanisms because data are limited compared to other salmonines.

Similar to steelhead and brown trout, percid harvest rates are also quite variable (Figures 9-12), yet these species are much more abundant in the areas where they are harvested. Variability in the harvest rates is likely influenced by the success of various year classes over the time series.

The decline in the yellow perch fishery on Lake Michigan is manifested well in the charter harvest rates, where rates plummeted from 25 fish per 5 hours in 1990 to 8.42 in 1991, and remained less than 6.00 per 5 hours since 1996 (Figure 9). Walleye harvest on Lake Michigan is generally restricted to the Bay de Noc area and is not discussed in this report.

Except for a peak in 1999, yellow perch harvest rates on Lake Huron (primarily Saginaw Bay) have also decreased over time (Figure 10). Walleye harvest rates are not as high as they were in the early 1990s but have remained somewhat stable since 1995 (Figure 10).

Yellow perch harvest rates on Lake Erie have fluctuated over the last 15 years, yet the 2004 yellow perch harvest rate is quite low relative to past years (Figure 11). Walleye harvest rates increased substantially in the mid-90s, but also decreased in 2004 (Figure 11). Similar to the explanation for lower effort in Lake Erie (as described in a previous section of this report), lower harvest rates may also be a consequence of effort redirected at other species and/or reporting errors.

Yellow perch harvest rates on the St. Clair system have been significantly higher in some years (mid 1990s, 2002) when strong year classes were likely in the fishery (Figure 12).

Currently, St. Clair yellow perch rates do not appear to be outside a range of rates observed in the last 10 years. Walleye harvest rates on the St. Clair System are significantly lower than yellow perch harvest rates, but also fall within a range observed in the past (Figure 12).

Sea lamprey incidence

In 2004, sea lamprey incidence on Chinook salmon decreased in both Lake Michigan and Lake Huron compared to 2003 (Figure 13); however, the decrease in Lake Michigan is insignificant relative to the overall increased incidence since 1999 (Figure 13). Sea lamprey incidence on Chinook salmon harvested from Lake Huron remains well below historical rates (Figure 13).

In 2004, sea lamprey occurrence on lake trout increased in Lakes Michigan, Huron and Superior (Figure 14). Similar to Chinook salmon, the increased incidence of lamprey on lake trout is more significant on Lake Michigan than on Lake Huron (Figure 14).

Acknowledgments

The author wishes to thank the Michigan Charter Boat Association for their support throughout the season. Donna Wesander-Russell contributed significantly to this report. Gratitude also goes out to Cheryl Benson (Fisheries Division, Lansing), who entered the data into the electronic database.

Table 1.—Total harvest per 5 targeted hours¹, number harvested, and fishing effort (hours, trips and excursions) from all charter boats on Lake Michigan and its tributaries, 2004.

Species	Total angler harvest per 5 hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Season
Coho salmon	0.166	0	0	0	317	887	931	1,566	3,528	1,935	44	0	0	9,208
Chinook salmon	1.234	0	0	0	511	8,004	3,495	15,875	29,616	10,868	221	0	0	68,590
Rainbow trout	0.116	29	83	289	151	633	878	1,409	1,809	516	349	436	316	6,898
Brown trout	0.013	2	1	6	157	165	33	127	130	35	36	10	3	705
Lake trout	0.102	0	0	0	2	797	1,218	1,542	1,609	492	4	1	1	5,666
Yellow perch	2.159	0	0	0	0	263	1,991	2,095	938	767	5	1	0	6,060 ²
Walleye	0.801	18	44	0	0	154	429	297	377	170	343	27	40	1,899
Other	0.160	0	0	0	2	14	101	125	112	47	15	0	2	418
Lamprey on:														
Chinook salmon		0	0	0	15	96	43	214	253	58	4	0	0	683
Lake trout		0	0	0	5	21	30	32	48	9	0	0	0	145
Angler hours		377	1,017	1,594	4,350	27,001	31,233	69,163	10,5810	42,580	4,986	2,820	1,896	292,829
Angler trips		51	133	209	680	4,721	5,255	11,780	18,186	7,566	735	385	258	49,959
Resident		8	31	100	464	3,030	3,375	8,181	13,192	5,518	368	146	90	34,503
Nonresident		43	102	109	216	1,691	1,880	3,599	4,994	2,048	367	239	168	15,456
Charter excursions		17	35	59	174	1,057	1,250	2,780	4,381	1,825	215	105	68	11,966

¹Salmonine harvest rates based on salmonine effort and percid harvest rates based on percid effort.

²Yellow perch harvest is lower than previous years because of reduced effort and incomplete reporting (at the time of publication of this report).

Table 2.—Total harvest per 5 targeted hours¹, number harvested, and fishing effort (hours, trips and excursions) from all charter boats on Lake Huron and its tributaries, 2004.

Species	Total angler harvest per 5 hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Season
Coho salmon	0.019	0	0	0	6	50	25	41	49	17	3	0	0	191
Chinook salmon	0.635	0	0	0	65	389	497	1,689	2,539	1,047	33	0	0	6,259
Rainbow trout	0.051	0	0	3	20	97	55	155	98	85	3	0	0	519
Brown trout	0.016	0	0	0	0	53	35	62	29	18	0	0	0	197
Lake trout	1.493	0	0	0	1	1,953	3,068	4,138	3,771	1,536	1	0	0	14,468
Yellow perch	0.111	0	0	0	0	0	10	32	64	39	0	0	0	145
Walleye	1.179	0	0	0	3	71	583	904	239	23	0	0	0	1,823
Other	0.110	0	0	0	0	62	86	202	472	59	7	0	0	888
Lamprey on:														
Chinook salmon		0	0	0	2	10	45	146	128	33	2	0	0	366
Lake trout		0	0	0	0	23	23	50	93	17	0	0	0	206
Angler hours		0	0	32	439	5,705	9,064	16,717	17,442	6,745	127	0	0	56,272
Angler trips		0	0	4	73	988	1,618	2,927	3,074	1,237	26	0	0	9,947
Resident		0	0	4	69	929	1,413	2,439	2,609	1,091	19	0	0	8,573
Nonresident		0	0	0	4	59	205	488	465	146	7	0	0	1,374
Charter excursions		0	0	2	28	271	429	751	785	348	8	0	0	2,622

¹Salmonine harvest rates based on salmonine effort and percid harvest rates based on percid effort.

Table 3.—Total harvest per 5 targeted hours¹, number harvested, and fishing effort (hours, trips and excursions) from all charter boats that fished in grids 701, 702, 703, 801 and 802 on Lake Erie, 2004.

Species	Total angler harvest per 5 hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Season
Coho salmon	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0
Chinook salmon	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0
Rainbow trout	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0
Brown trout	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0
Lake trout	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow perch	2.186	0	0	0	0	634	945	1,699	3,807	1,896	774	0	0	9,755
Walleye	3.004	0	0	0	0	27	6,708	4,055	617	79	0	0	0	11,486
Other	0.052	0	0	0	0	0	93	76	0	29	0	0	0	198
Lamprey on:														
Chinook salmon		0	0	0	0	0	0	0	0	0	0	0	0	0
Lake trout		0	0	0	0	0	2	0	0	0	0	0	0	2
Angler hours		0	0	0	0	140	9,736	6,413	2,204	808	297	0	0	19,598
Angler trips		0	0	0	0	28	1,786	1,170	404	154	61	0	0	3,603
Resident		0	0	0	0	26	1,536	984	338	147	39	0	0	3,070
Nonresident		0	0	0	0	2	250	186	66	7	22	0	0	533
Charter excursions		0	0	0	0	7	351	230	85	31	14	0	0	718

¹Salmonine harvest rates based on salmonine effort and percid harvest rates based on percid effort.

Table 4.—Total harvest per 5 targeted hours¹, number harvested, and fishing effort (hours, trips and excursions) from all charter boats on Lake Superior, 2004.

Species	Total angler harvest per 5 hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Season
Coho salmon	0.068	0	0	0	0	9	105	43	26	5	0	0	0	188
Chinook salmon	0.035	0	0	0	0	7	12	43	28	4	0	0	0	94
Rainbow trout	0.022	0	0	0	0	1	20	26	10	5	1	0	0	63
Brown trout	0.002	0	0	0	0	0	5	1	0	0	0	0	0	6
Lake trout	1.486	0	0	0	0	127	883	1,623	1,093	365	20	0	0	4,111
Yellow perch	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0
Walleye	0.317	0	0	0	0	0	0	0	4	0	0	0	0	4
Other	1.429	0	0	0	0	0	1	22	3	2	0	0	0	28
Lamprey on:														
Chinook salmon		0	0	0	0	0	0	0	0	0	0	0	0	0
Lake trout		0	0	0	0	0	8	14	6	4	0	0	0	32
Angler hours		0	0	0	0	381	3,126	5,490	3,582	1,297	66	0	0	13,943
Angler trips		0	0	0	0	68	425	773	590	177	11	0	0	2,044
Resident		0	0	0	0	19	170	335	311	69	0	0	0	904
Nonresident		0	0	0	0	49	255	438	279	108	11	0	0	1,140
Charter excursions		0	0	0	0	16	90	168	140	37	4	0	0	455

¹Salmonine harvest rates based on salmonine effort and percid harvest rates based on percid harvest.

Table 5.—Total harvest per 5 targeted hours¹, number harvested, and fishing effort (hours, trips and excursions) from all charter boats on the St. Clair system (Lake St. Clair, St. Clair River and Detroit River), 2004.

Species	Total angler harvest per 5 hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Season
Coho salmon	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0
Chinook salmon	0.497	0	0	0	18	0	0	0	0	1	0	0	0	19
Rainbow trout	0.000	0	0	0	1	0	0	0	0	0	0	0	0	1
Brown trout	0.000	0	0	0	1	0	0	0	0	0	0	0	0	1
Lake trout	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow perch	2.132	0	0	0	6	41	648	760	794	532	729	0	0	3,510
Walleye	1.294	0	0	5	899	766	269	106	67	5	0		0	2,117
Other	1.050	0	0	0	2	0	560	500	409	253	3	0	0	1,727
Lamprey on:														
Chinook salmon		0	0	0	0	0	0	0	0	0	0	0	0	0
Lake trout		0	0	0	0	0	3	0	0	0	0	0	0	3
Angler hours		0	0	48	2,659	1,563	1,437	1,037	795	536	318	0	0	8,394
Angler trips		0	0	8	383	215	236	166	132	88	64	0	0	1,292
Resident		0	0	8	288	200	219	164	129	88	63	0	0	1,159
Nonresident		0	0	0	95	15	17	2	3	0	1	0	0	133
Charter excursions		0	0	2	107	59	65	37	30	21	18	0	0	339

¹Salmonine harvest rates based on salmonine effort and percid harvest rates based on percid harvest.

Figure 1.—Total number of charter anglers (trips) on the Michigan waters of all the Great Lakes (including tributaries), 1990-2004.

Year	Trip Number
1990	85,079
1991	85,902
1992	68,545
1993	67,615
1994	66,047
1995	72,427
1996	74,864
1997	74,431
1998	83,862
1999	82,181
2000	81,940
2001	79,083
2002	76,352
2003	76,151
2004	66,845

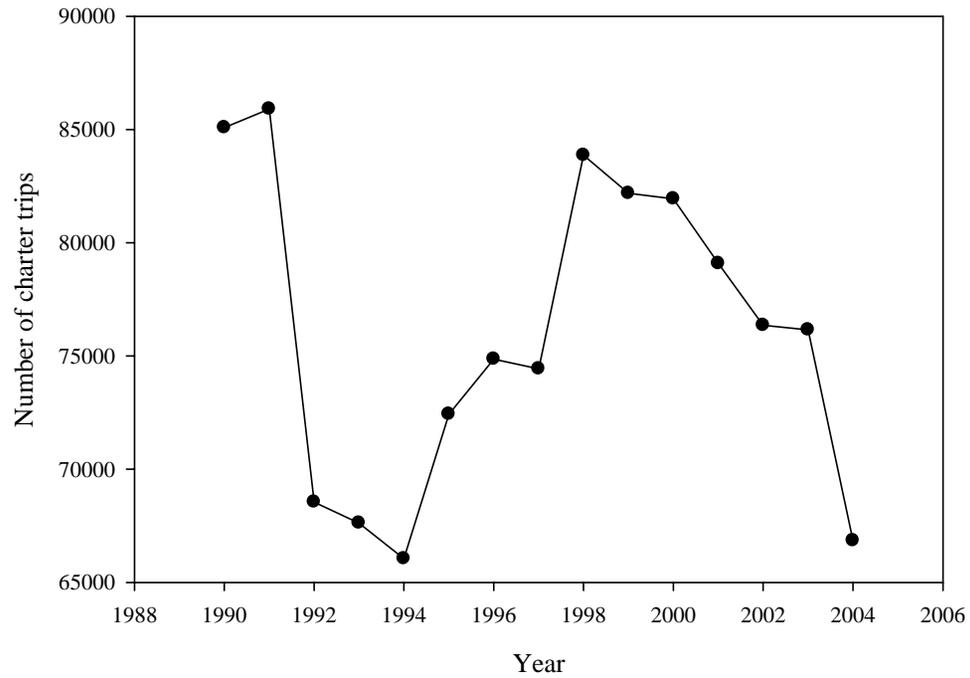


Figure 2(a).—Number of charter anglers (trips) on the Michigan waters of the Great Lakes (including tributaries), 1990-2004. Note: The numbers of Lake Michigan charter trips in the figure are the actual number of Lake Michigan trips divided by two.

Year	Lake Michigan	Lake Huron
1990	57,140	14,604
1991	62,578	12,012
1992	47,145	8,965
1993	46,510	8,069
1994	46,759	7,613
1995	51,515	9,432
1996	52,527	9,612
1997	52,805	9,684
1998	60,250	11,913
1999	55,578	11,861
2000	57,006	11,009
2001	53,645	11,555
2002	53,213	10,742
2003	52,972	10,318
2004	49,959	9,947

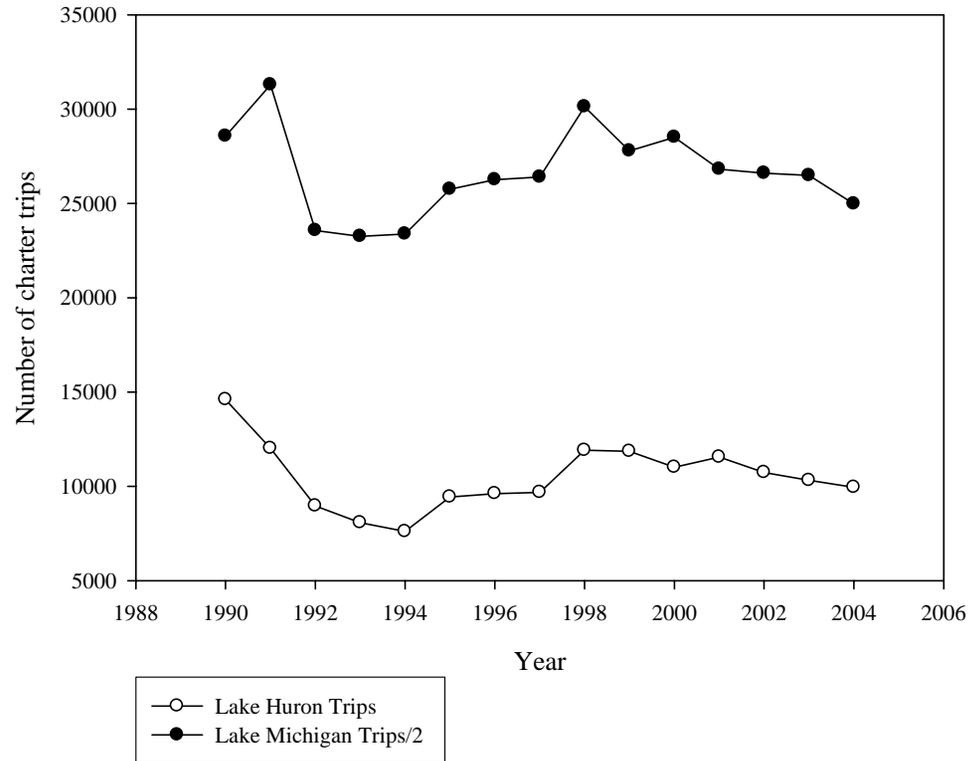


Figure 2 (b).—Number of charter anglers (trips) on the Michigan waters of the Great Lakes (including tributaries), 1990-2004. Note: The numbers of Lake Erie charter trips in the figure are the actual number of Lake Erie trips divided by two.

Year	Lake Erie	Lake Superior	St Clair System
1990	8,073	3,337	1,925
1991	6,139	3,588	1,585
1992	7,202	3,399	1,834
1993	8,829	2,858	1,349
1994	7,564	3,053	1,058
1995	8,144	2,411	925
1996	8,873	2,569	1,283
1997	8,280	2,481	1,181
1998	8,148	2,303	1,248
1999	10,645	2,869	1,228
2000	10,153	2,335	1,437
2001	10,226	2,222	1,435
2002	9,232	2,104	1,061
2003	8,514	2,446	1,901
2004	3,603	2,044	1,292

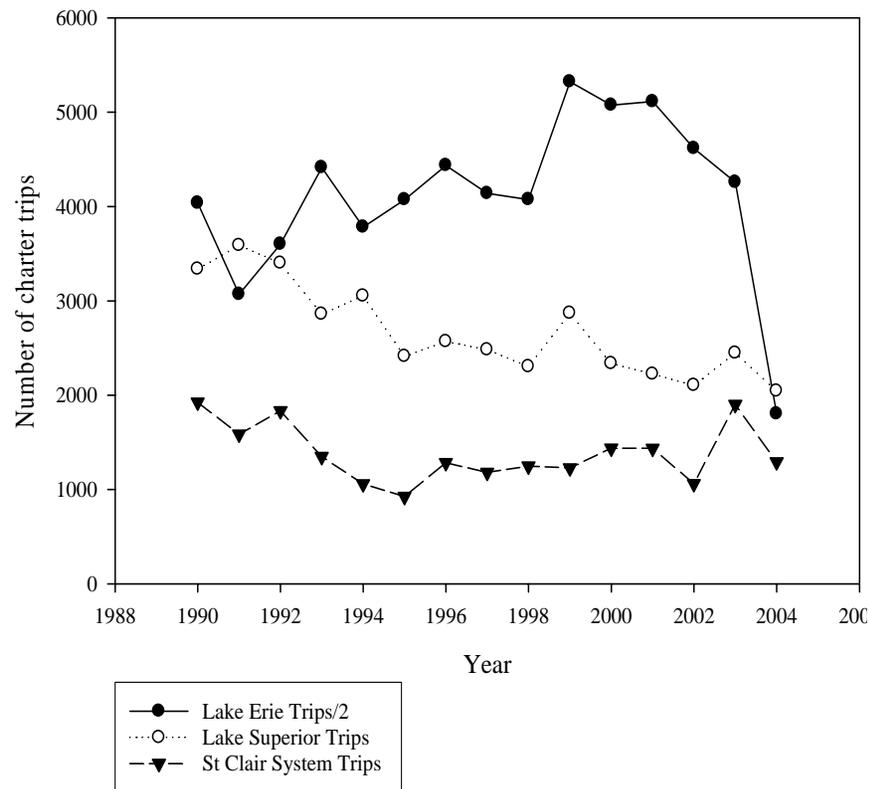


Figure 3.—Number of fish harvested by charter anglers on Michigan waters of the Great Lakes, 1990-2004.

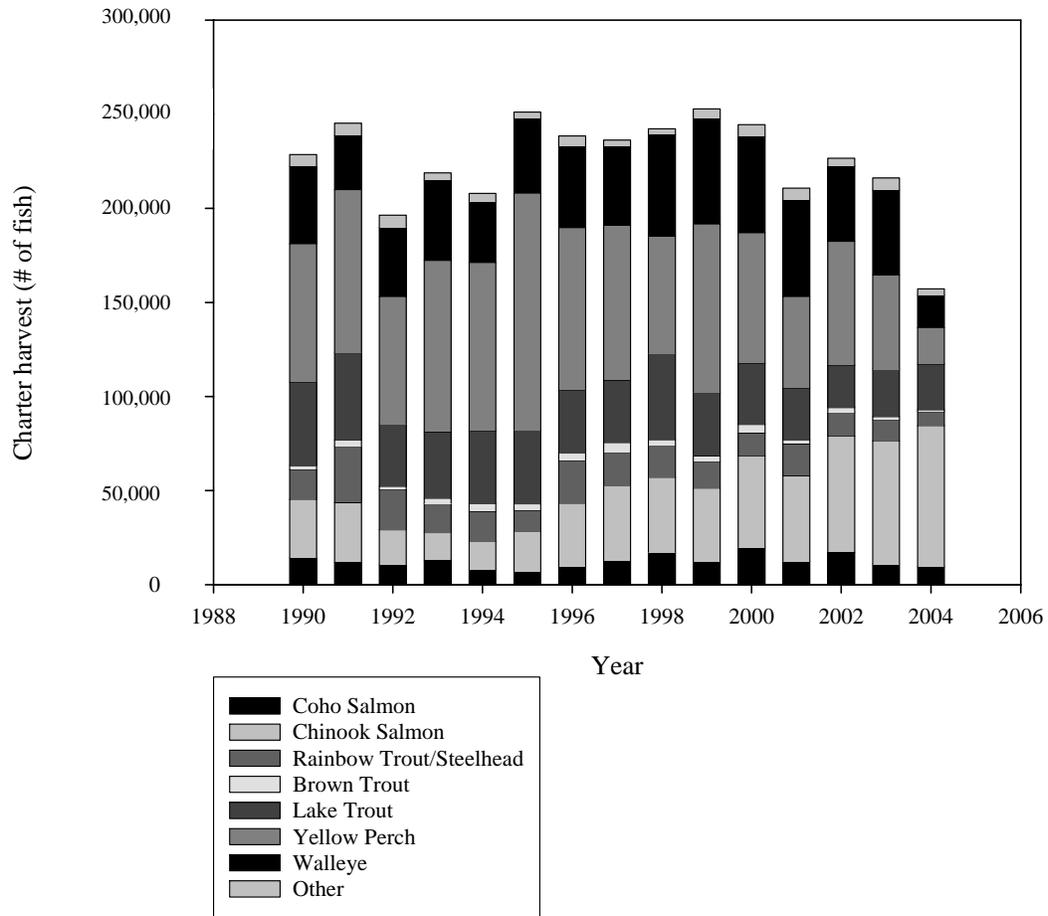


Figure 4.—Charter angler harvest rates (fish per 5 angler hours) for Chinook salmon on Lakes Michigan and Lake Huron.

Year	Lake Michigan	Lake Huron
1990	0.37	0.35
1991	0.39	0.40
1992	0.27	0.41
1993	0.21	0.45
1994	0.22	0.50
1995	0.29	0.72
1996	0.50	0.71
1997	0.53	1.04
1998	0.44	0.93
1999	0.48	0.96
2000	0.67	0.75
2001	0.62	0.75
2002	0.84	1.04
2003	0.97	0.86
2004	1.23	0.63

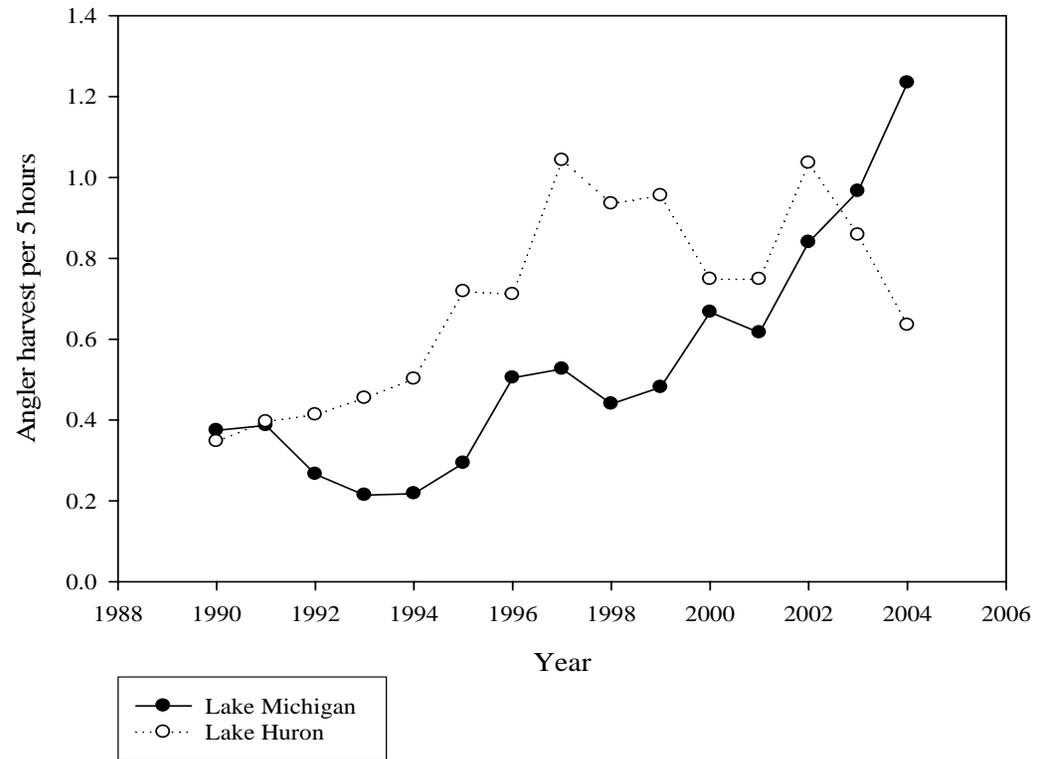


Figure 5.—Charter angler harvest rates (fish per 5 angler hours) for lake trout on Lakes Michigan, Huron and Superior.

Year	Lake Michigan	Lake Huron	Lake Superior
1990	0.42	0.60	1.42
1991	0.48	0.53	1.40
1992	0.41	0.43	1.33
1993	0.52	0.26	1.44
1994	0.57	0.39	1.33
1995	0.61	0.41	1.31
1996	0.42	0.57	1.43
1997	0.39	0.56	1.34
1998	0.50	0.75	1.27
1999	0.34	0.71	1.32
2000	0.32	0.80	1.36
2001	0.26	0.65	1.51
2002	0.17	0.71	1.38
2003	0.14	1.08	1.36
2004	0.10	1.49	1.49

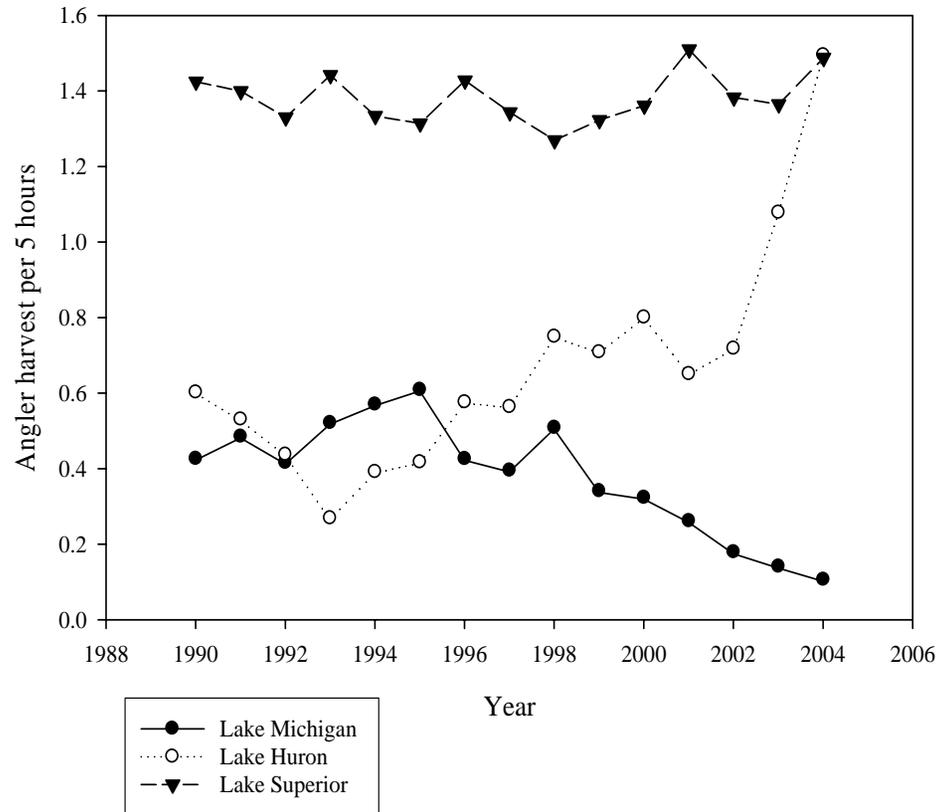


Figure 6.—Charter angler harvest rates (fish per 5 angler hours) for coho salmon on Lakes Michigan, Huron and Superior.

Year	Lake Michigan	Lake Huron	Lake Superior
1990	0.20	0.01	0.06
1991	0.16	0.02	0.16
1992	0.18	0.01	0.06
1993	0.24	0.02	0.05
1994	0.14	0.02	0.07
1995	0.13	0.01	0.08
1996	0.17	0.02	0.09
1997	0.21	0.01	0.06
1998	0.26	0.02	0.04
1999	0.18	0.06	0.12
2000	0.31	0.04	0.05
2001	0.19	0.03	0.09
2002	0.26	0.12	0.11
2003	0.18	0.03	0.03
2004	0.17	0.02	0.07

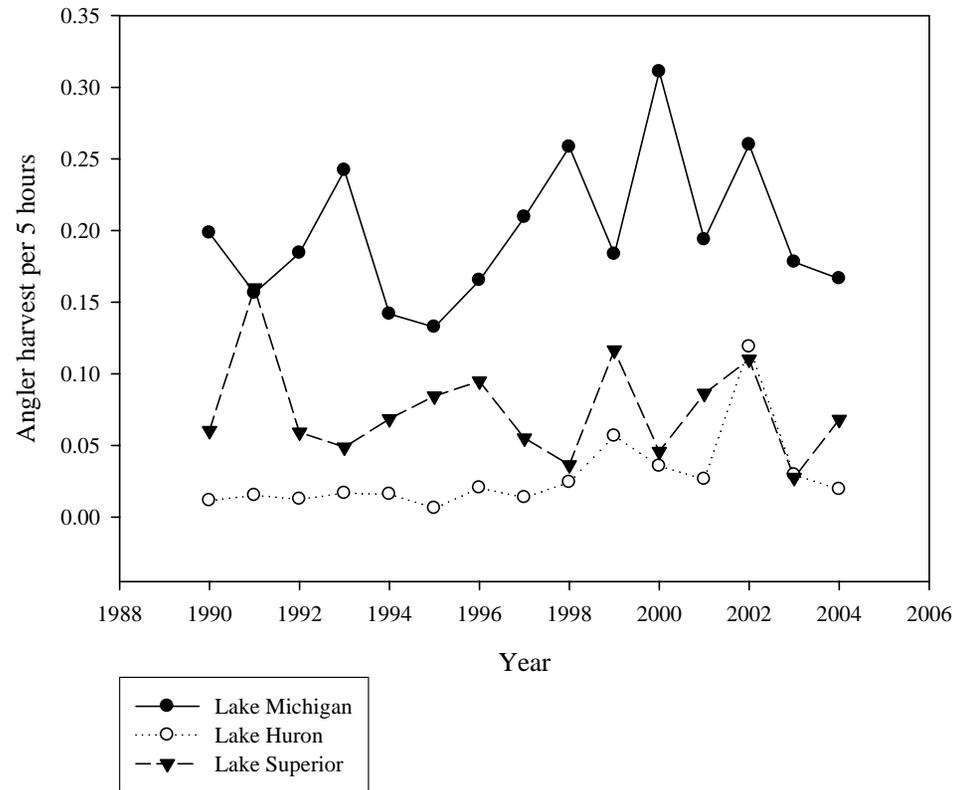


Figure 7.—Charter angler harvest rates (fish per 5 angler hours) for rainbow trout (steelhead) on Lakes Michigan and Huron, 1990-2004.

Year	Lake Michigan	Lake Huron
1990	0.22	0.02
1991	0.42	0.04
1992	0.37	0.05
1993	0.28	0.09
1994	0.29	0.08
1995	0.19	0.16
1996	0.39	0.17
1997	0.29	0.12
1998	0.24	0.08
1999	0.22	0.08
2000	0.18	0.08
2001	0.26	0.10
2002	0.19	0.09
2003	0.18	0.04
2004	0.12	0.05

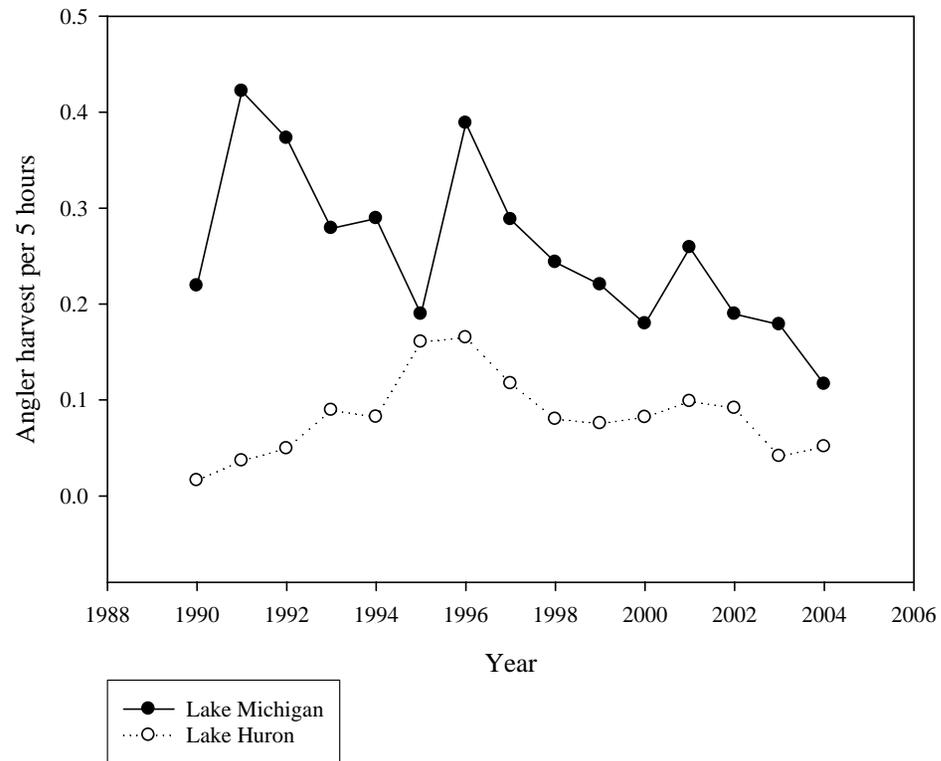


Figure 8.—Charter angler harvest rates (fish per 5 angler hours) for brown trout on Lakes Michigan and Huron.

Year	Lake Michigan	Lake Huron
1990	0.03	0.01
1991	0.05	0.01
1992	0.02	0.04
1993	0.04	0.10
1994	0.06	0.12
1995	0.05	0.11
1996	0.06	0.05
1997	0.08	0.02
1998	0.04	0.03
1999	0.04	0.01
2000	0.07	0.01
2001	0.03	0.01
2002	0.04	0.02
2003	0.02	0.03
2004	0.01	0.02

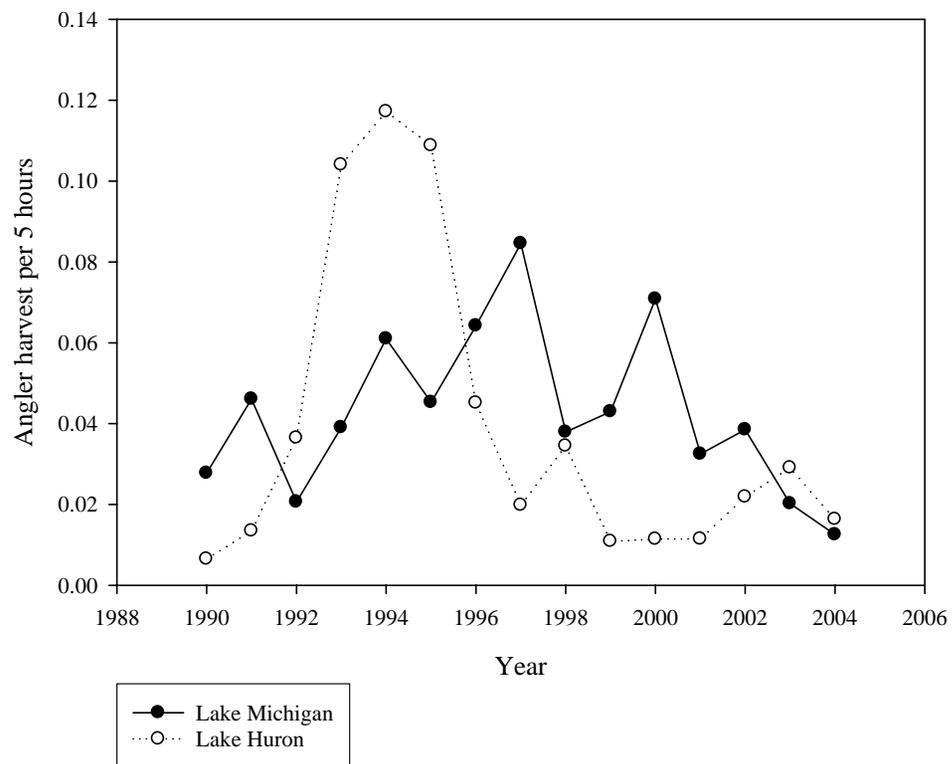


Figure 9.—Charter angler harvest rates (fish per 5 angler hours) for yellow perch on Lake Michigan.

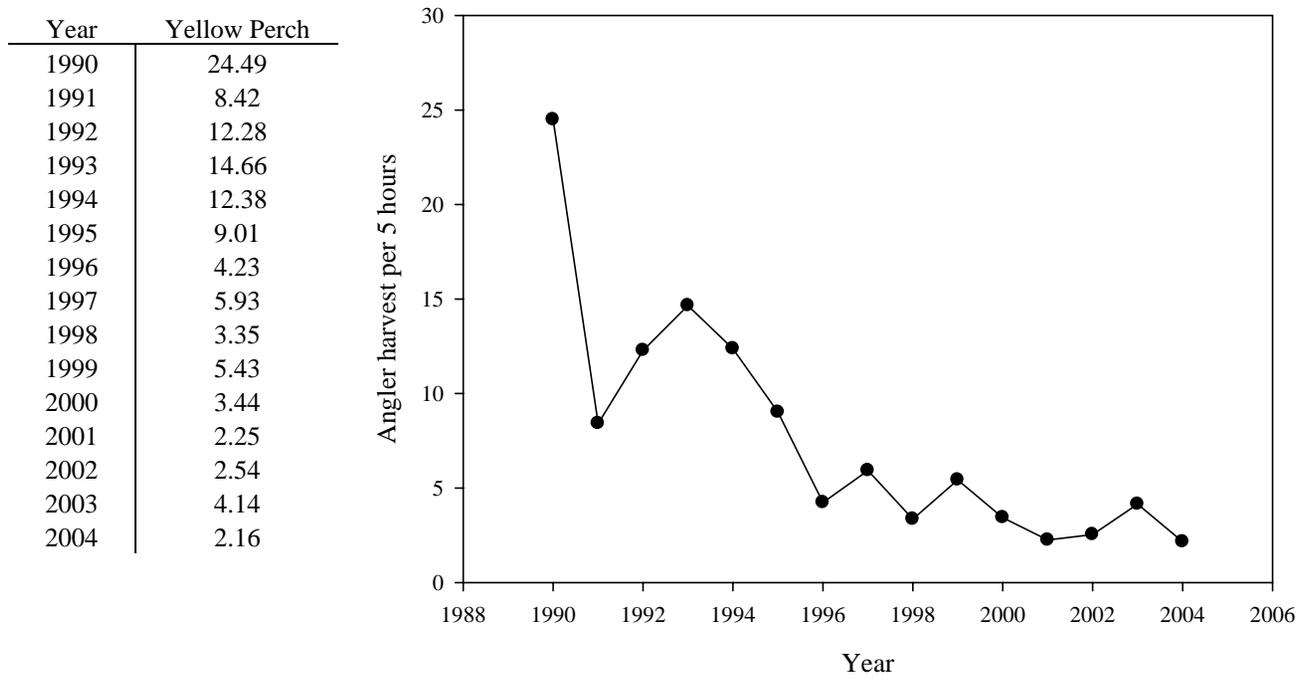


Figure 10.—Charter angler harvest rates (fish per 5 angler hours) for yellow perch and walleye on Lake Huron.

Year	Yellow Perch	Walleye
1990	3.28	1.57
1991	1.72	1.47
1992	1.57	1.56
1993	0.91	1.62
1994	1.42	1.77
1995	1.19	0.87
1996	0.90	1.06
1997	0.69	1.22
1998	0.92	1.28
1999	2.61	0.98
2000	1.13	1.21
2001	0.90	1.13
2002	0.39	0.98
2003	0.42	1.20
2004	0.11	1.18

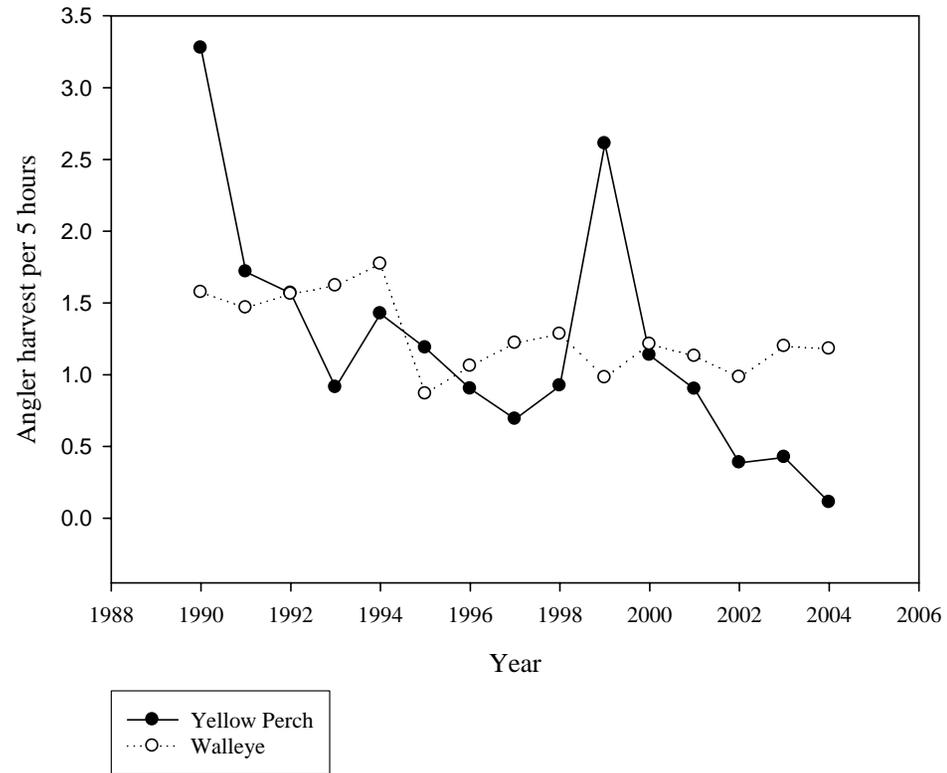


Figure 11.—Charter angler harvest rates (fish per 5 angler hours) for yellow perch and walleye on Lake Erie.

Year	Yellow Perch	Walleye
1990	1.52	3.77
1991	1.99	3.21
1992	2.51	4.21
1993	2.30	4.05
1994	1.70	3.48
1995	2.59	4.17
1996	3.95	4.12
1997	3.77	4.21
1998	3.52	5.37
1999	3.72	4.22
2000	3.34	3.89
2001	2.85	4.27
2002	5.01	3.71
2003	3.13	4.30
2004	2.19	3.00

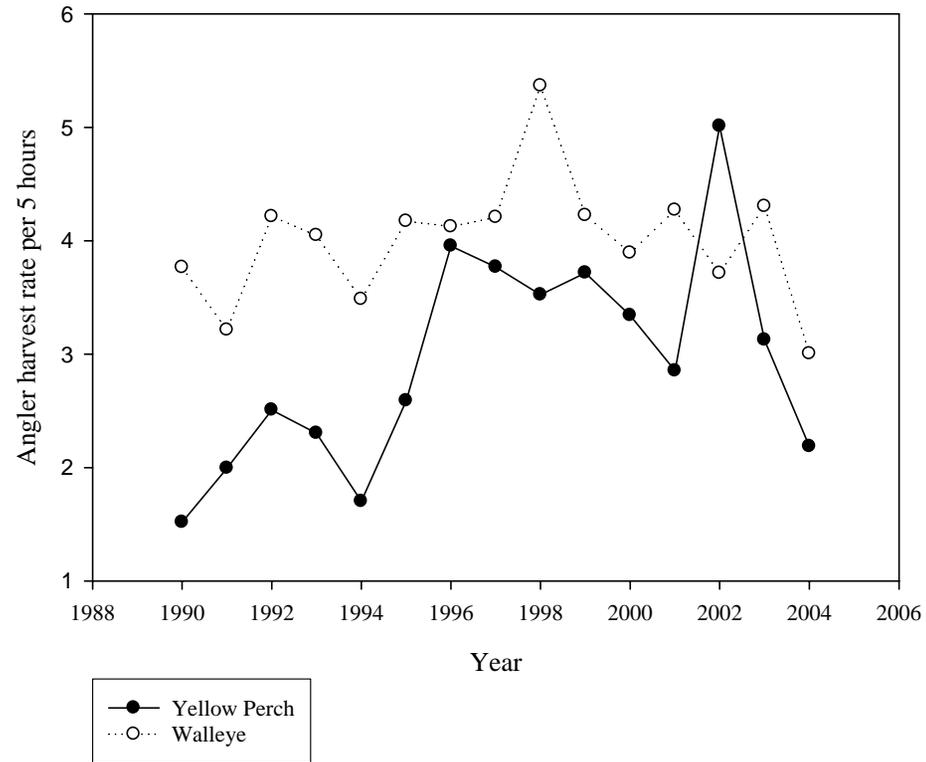


Figure 12.—Charter angler harvest rates (fish per 5 angler hours) for yellow perch and walleye on the St. Clair System.

Year	Yellow Perch	Walleye
1990	1.25	1.42
1991	1.52	0.88
1992	0.93	0.79
1993	1.39	1.13
1994	3.79	0.59
1995	3.39	1.07
1996	5.06	0.81
1997	3.86	0.95
1998	2.28	1.03
1999	2.40	0.99
2000	2.54	1.01
2001	3.43	1.35
2002	6.12	0.76
2003	2.44	1.24
2004	2.13	1.29

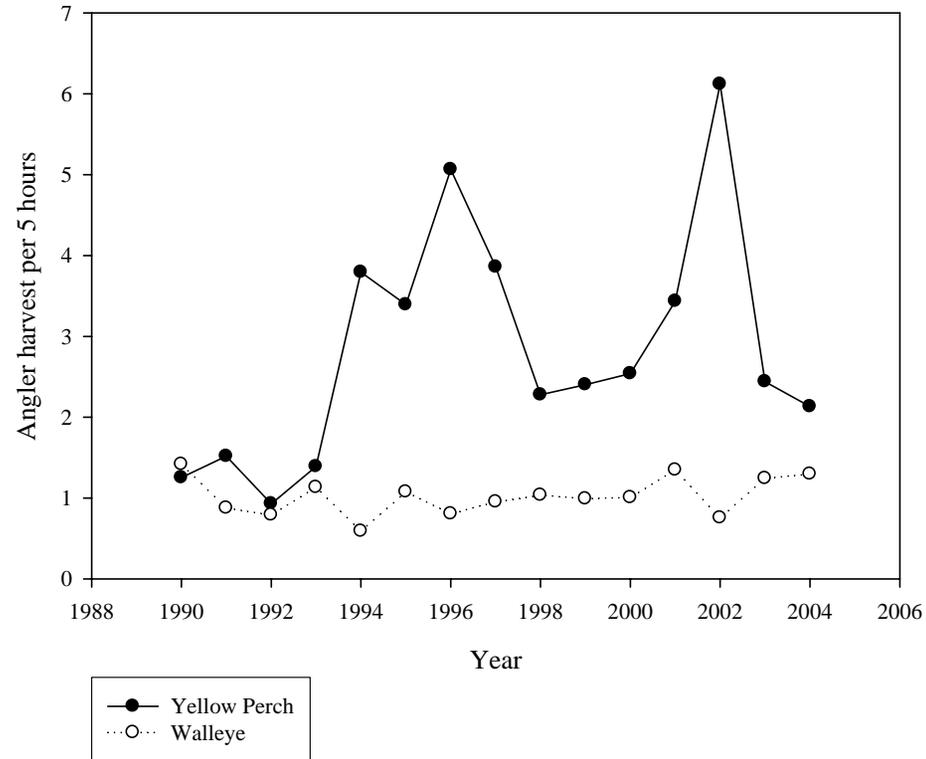


Figure 13.—Sea lamprey incidence (number attached per 100 fish) on Chinook salmon harvested by charter anglers on Lakes Michigan and Huron. Note: The numbers of lamprey on Lake Huron Chinook are the actual number divided by five.

Year	Lake Huron	Lake Michigan
1990	18.6	0.5
1991	13.9	0.3
1992	13.6	0.2
1993	7.6	0.1
1994	7.1	0.3
1995	6.2	0.3
1996	3.9	0.1
1997	4.7	0.2
1998	5.2	0.4
1999	4.6	0.2
2000	7.3	0.4
2001	4.6	0.5
2002	4.2	0.8
2003	6.0	1.2
2004	5.8	1.0

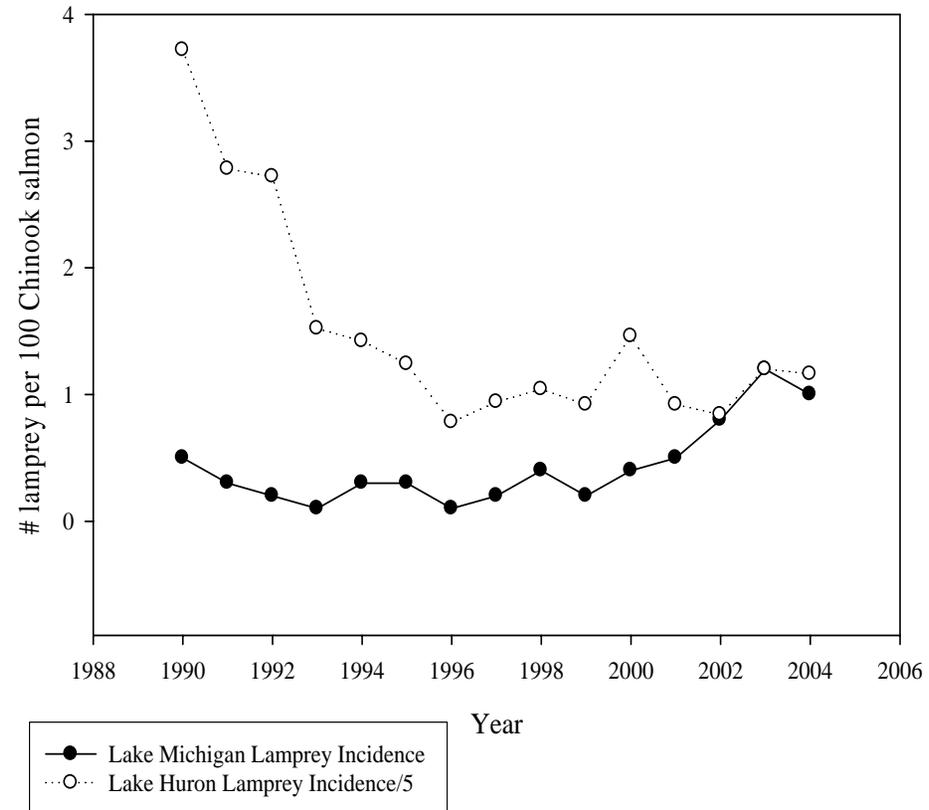


Figure 14.—Sea lamprey incidence (number attached per 100 fish) on lake trout harvested by charter anglers on Lakes Michigan, Huron and Superior.

Year	Lake Michigan	Lake Huron	Lake Superior
1990	1.8	6.6	1.8
1991	1.2	5.7	1.6
1992	0.8	4.6	0.8
1993	0.6	2.1	0.5
1994	0.6	3.3	1.1
1995	1.0	2.7	0.7
1996	0.7	1.9	1.0
1997	1.1	3.0	0.6
1998	1.1	2.1	0.5
1999	1.2	1.8	0.5
2000	1.3	2.2	0.4
2001	1.3	2.0	0.7
2002	2.2	1.5	0.4
2003	2.4	1.3	0.7
2004	2.6	1.4	0.8

